

International IR Rectifier

PD - 91810

SMPS MOSFET

IRFIB7N50A

HEXFET® Power MOSFET

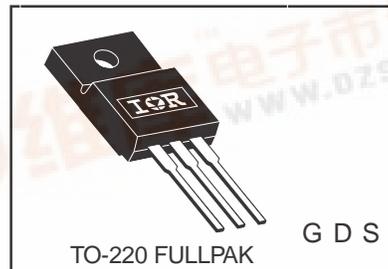
Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptable Power Supply
- High speed power switching
- High Voltage Isolation = 2.5KVRMS⑦

Benefits

- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective Coss specified (See AN 1001)

V _{DSS}	R _{ds(on)} max	I _D
500V	0.52Ω	6.6A



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	6.6	A
I _D @ T _C = 100°C	Continuous Drain Current, V _{GS} @ 10V	4.2	
I _{DM}	Pulsed Drain Current ①⑥	44	
P _D @ T _C = 25°C	Power Dissipation	60	W
	Linear Derating Factor	0.48	W/°C
V _{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③⑥	6.9	V/ns
T _J	Operating Junction and	-55 to + 150	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Applicable Off Line SMPS Topologies:

- Two Transistor Forward
- Half & Full Bridge Convertors
- Power Factor Correction Boost

Notes ① through ⑦ are on page 8

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Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	500	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient	—	0.61	—	V/°C	Reference to 25°C, I _D = 1mA [Ⓒ]
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.52	Ω	V _{GS} = 10V, I _D = 4.0A ^④
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	V _{DS} = 500V, V _{GS} = 0V
		—	—	250		V _{DS} = 400V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 30V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -30V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	6.1	—	—	S	V _{DS} = 50V, I _D = 6.6A [Ⓒ]
Q _g	Total Gate Charge	—	—	52	nC	I _D = 11A
Q _{gs}	Gate-to-Source Charge	—	—	13		V _{DS} = 400V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	—	18		V _{GS} = 10V, See Fig. 6 and 13 ^{④⑥}
t _{d(on)}	Turn-On Delay Time	—	14	—	ns	V _{DD} = 250V
t _r	Rise Time	—	35	—		I _D = 11A
t _{d(off)}	Turn-Off Delay Time	—	32	—		R _G = 9.1Ω
t _f	Fall Time	—	28	—		R _D = 22Ω, See Fig. 10 ^{④⑥}
C _{iss}	Input Capacitance	—	1423	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	208	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	8.1	—		f = 1.0MHz, See Fig. 5 [Ⓒ]
C _{oss}	Output Capacitance [Ⓒ]	—	2000	—		V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance [Ⓒ]	—	55	—		V _{GS} = 0V, V _{DS} = 400V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance	—	97	—		V _{GS} = 0V, V _{DS} = 0V to 400V ^{⑤⑥}

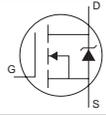
Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ^{②⑥}	—	275	mJ
I _{AR}	Avalanche Current ^{①⑥}	—	11	A
E _{AR}	Repetitive Avalanche Energy ^①	—	6.0	mJ

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	—	2.1	°C/W
R _{θJA}	Junction-to-Ambient	—	65	

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	6.6	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ^{①⑥}	—	—	44		
V _{SD}	Diode Forward Voltage	—	—	1.5	V	T _J = 25°C, I _S = 11A, V _{GS} = 0V ^④
t _{rr}	Reverse Recovery Time	—	510	770	ns	T _J = 25°C, I _F = 11A
Q _{rr}	Reverse Recovery Charge	—	3.4	5.1	μC	di/dt = 100A/μs ^{④⑥}
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

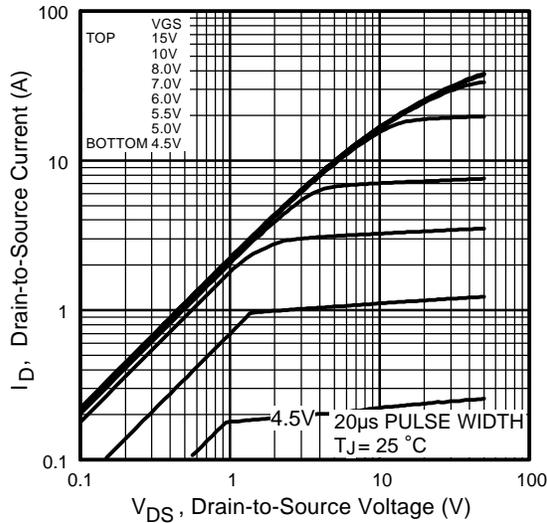


Fig 1. Typical Output Characteristics

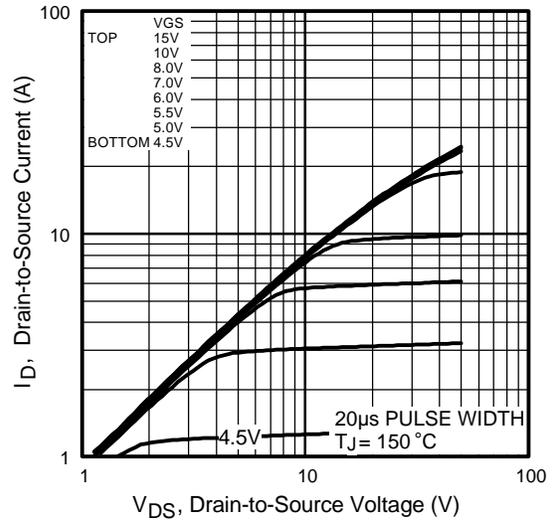


Fig 2. Typical Output Characteristics

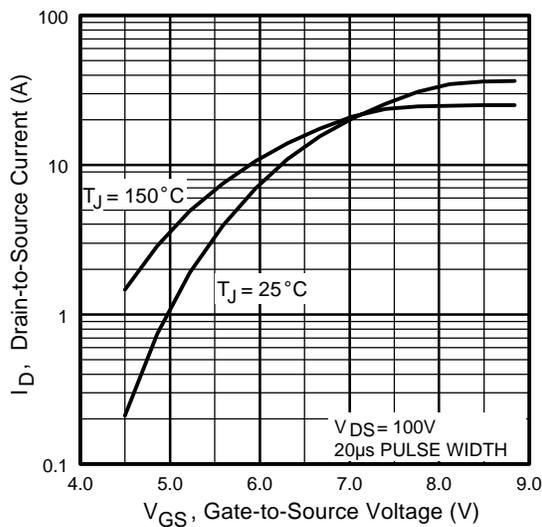


Fig 3. Typical Transfer Characteristics

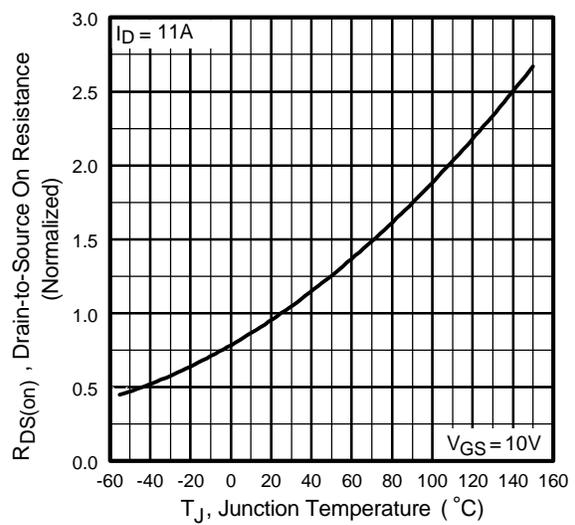


Fig 4. Normalized On-Resistance Vs. Temperature

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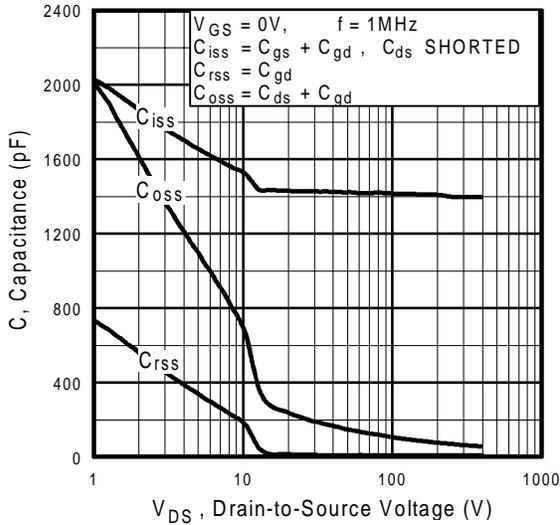


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

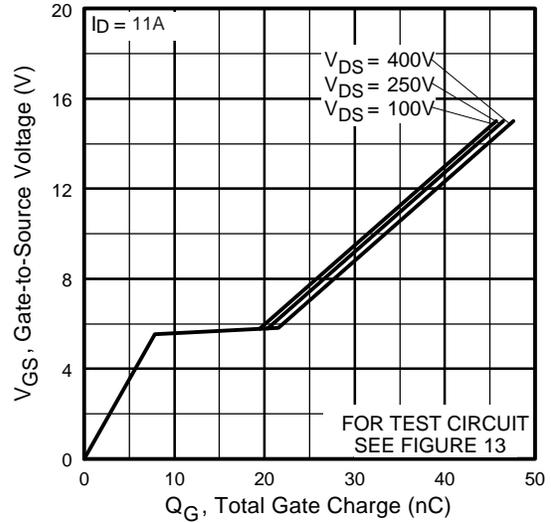


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

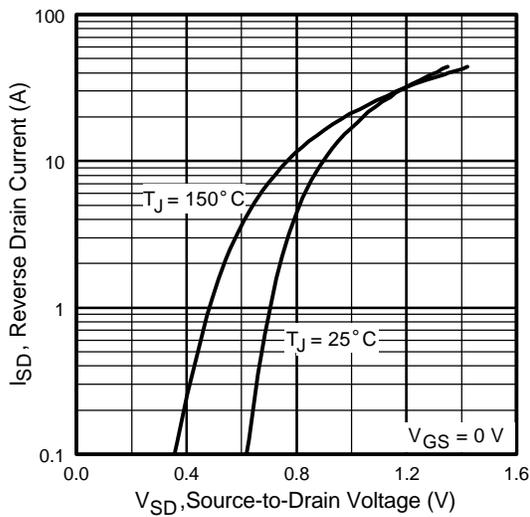


Fig 7. Typical Source-Drain Diode Forward Voltage

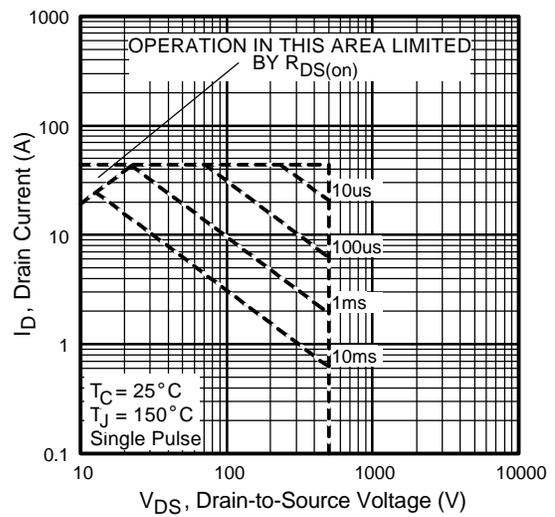


Fig 8. Maximum Safe Operating Area

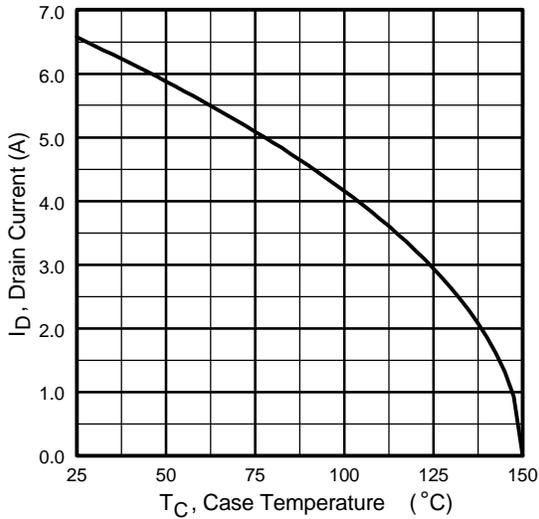


Fig 9. Maximum Drain Current Vs. Case Temperature

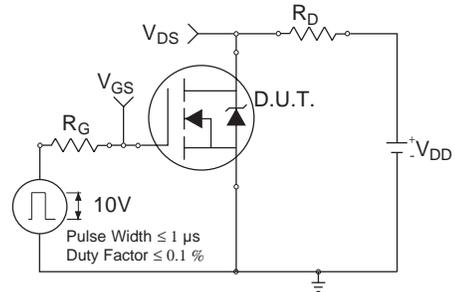


Fig 10a. Switching Time Test Circuit

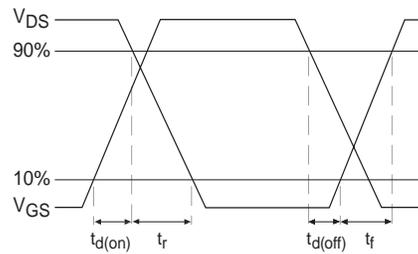


Fig 10b. Switching Time Waveforms

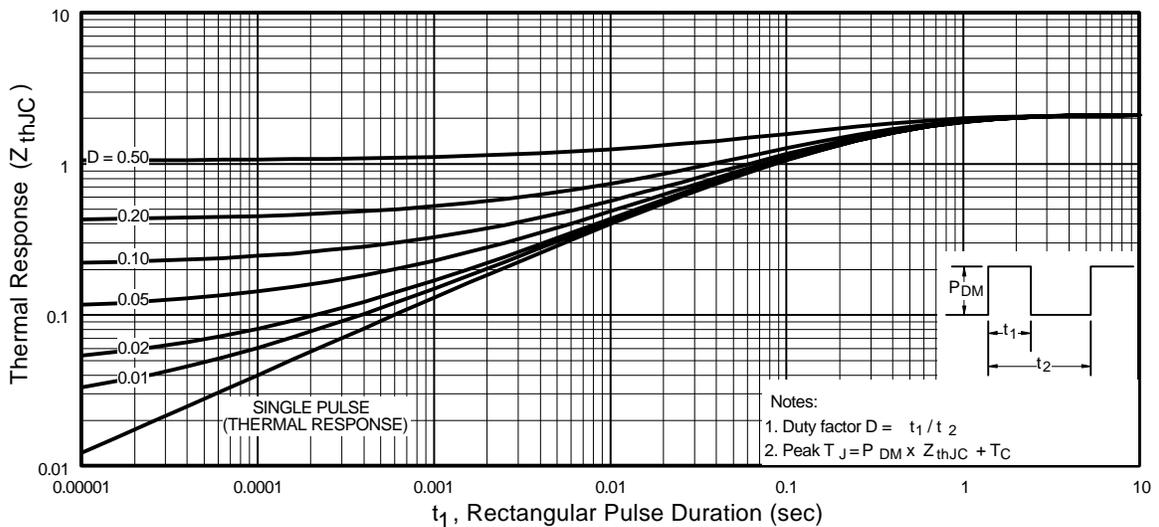


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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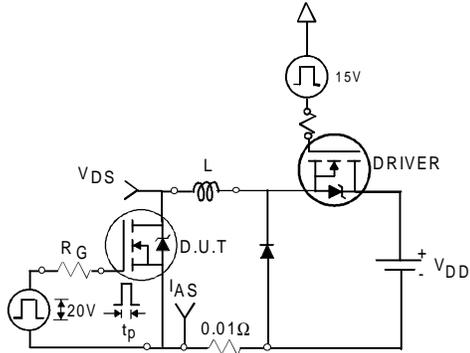


Fig 12a. Unclamped Inductive Test Circuit

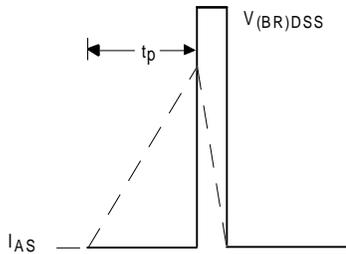


Fig 12b. Unclamped Inductive Waveforms

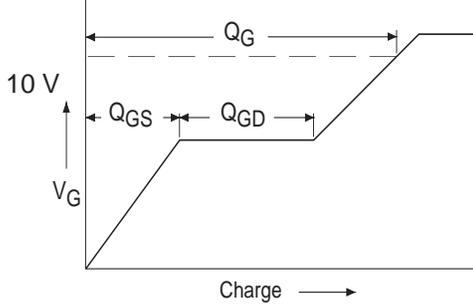


Fig 13a. Basic Gate Charge Waveform

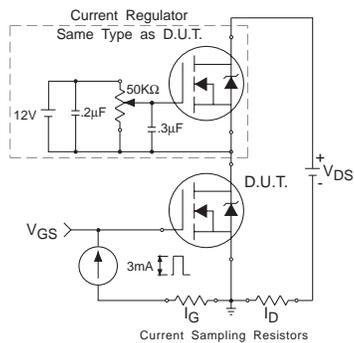


Fig 13b. Gate Charge Test Circuit

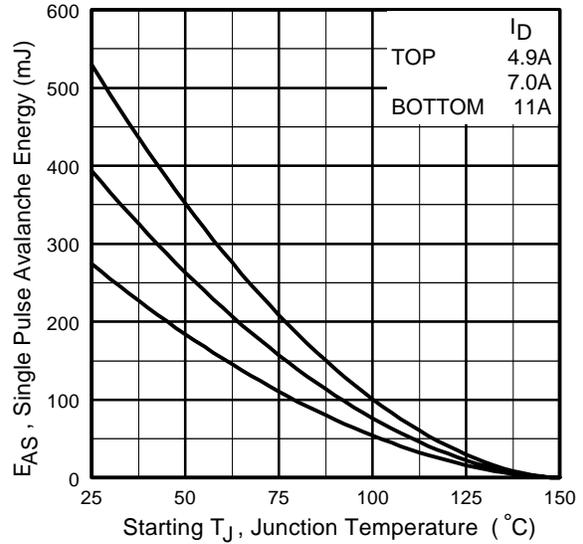


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

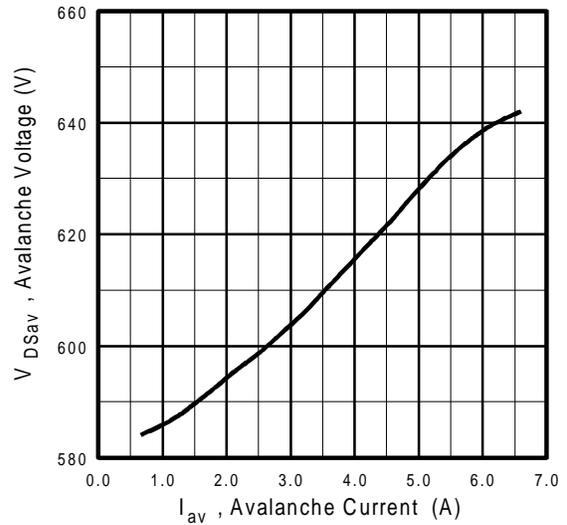
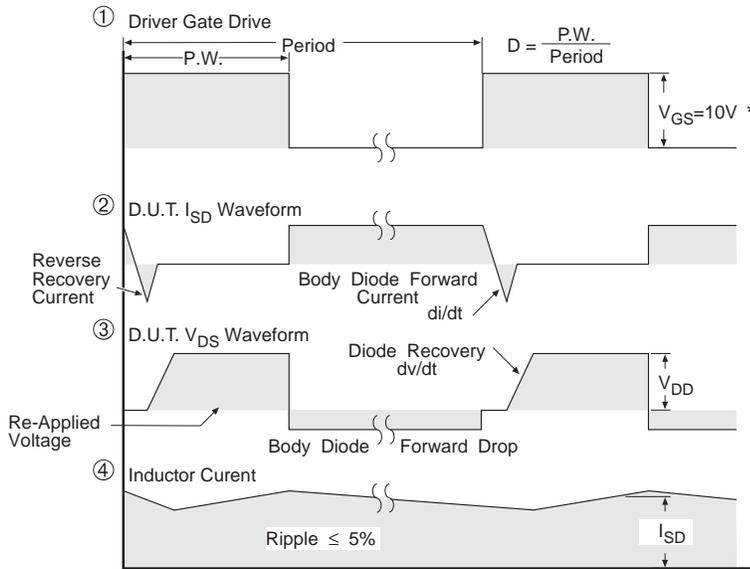
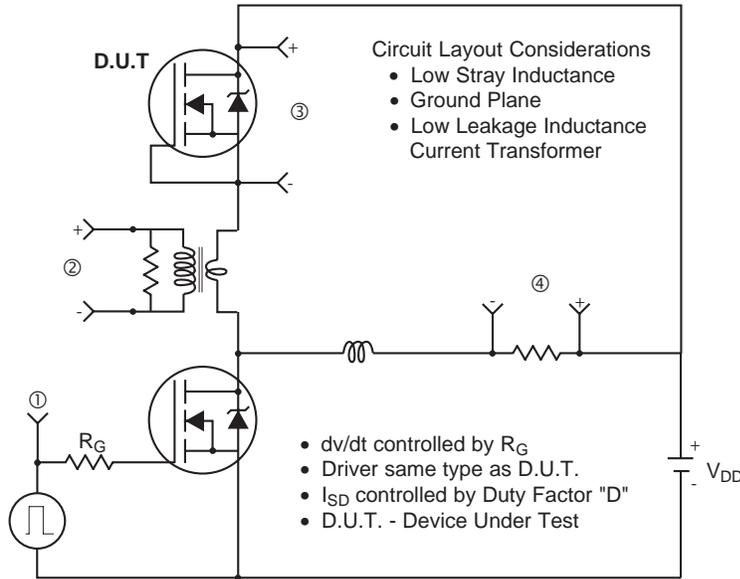


Fig 12d. Typical Drain-to-Source Voltage Vs. Avalanche Current

Peak Diode Recovery dv/dt Test Circuit



* $V_{GS} = 5V$ for Logic Level Devices

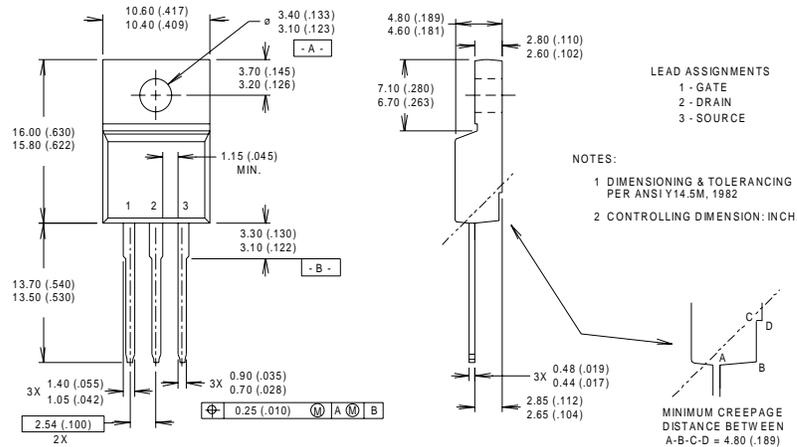
Fig 14. For N-Channel HEXFETS

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Package Outline TO-220 Fullpak Outline

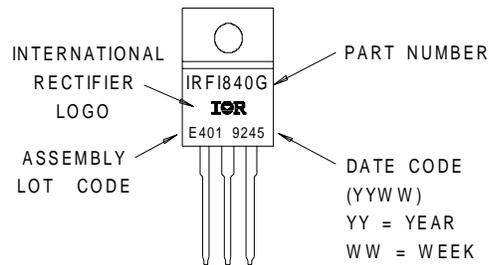
Dimensions are shown in millimeters (inches)



Part Marking Information

TO-220 Fullpak

EXAMPLE : THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE E401



Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Starting $T_J = 25^\circ\text{C}$, $L = 4.5\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 11\text{A}$. (See Figure 12)
- ③ $I_{SD} \leq 11\text{A}$, $di/dt \leq 140\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑤ C_{OSS} eff. is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS}
- ⑥ Uses IRFB11N50A data and test conditions
- ⑦ $t=60\text{s}, f=60\text{Hz}$

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WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331

IR GREAT BRITAIN: Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020

IR CANADA: 15 Lincoln Court, Brampton, Ontario L6T3Z2, Tel: (905) 453 2200

IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590

IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111

IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086

IR SOUTHEAST ASIA: 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994 Tel: ++ 65 838 4630

IR TAIWAN: 16 Fl. Suite D. 207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan Tel: 886-2-2377-9936

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